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09/123,430 07/28/98 YATES

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EXAMINER

MM91/1121

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ART UNIT

PAPER NUMBER

2823

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11/21/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

# Office Action Summary

Application No.

09/123,430

Applicant(s)

YATES, DONALD L.

Examiner

Brook Kebede

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 27 October 2000.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-27 and 44 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-12,14-22,24-27 and 44 is/are rejected.
- 7) ☒ Claim(s) 3,13 and 23 is/are objected to.
- 8) ☐ Claims \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

## Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892)
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 18) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Amendment***

1. The amendment filed on October 4, 2000 in Paper No. 11 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: "a non-uniform flow rate" in claims 1, 7, 17, and 44. Applicant is required to cancel the new matter in the reply to this Office Action.

### ***Duplicate Claim Objections***

2. Claim 3 is objected to under 37 CFR 1.75 as being a substantial duplicate of claim 2. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k). As result, claim 3 is withdrawn from further consideration.

### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 1-10, 16, 17-20, 26, 27 and 44 rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Re claims 1, 7, 17 and 44, the claimed limitation "a non-uniform flow rate" has no support in the specification as originally filed. Therefore, the claimed limitation "a non-uniform flow rate" does not contain a written description of the invention in full, clear concise manner as required by first paragraph of 35 USC § 112.

Claims 2-6, 8-10, 16, 18-20, 26 and 27 are rejected as being dependent of the rejected base claim.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 17-27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 17, the phrase "predetermine" in line 5 renders the claim indefinite because it is unclear whether the limitation(s) following the phrase are part of the claimed invention.

Regarding claim 21, the phrase "predetermine" in line 5 renders the claim indefinite because it is unclear whether the limitation(s) following the phrase are part of the claimed invention.

Regarding claim 22, the phrase "predetermine" in line 5 renders the claim indefinite because it is unclear whether the limitation(s) following the phrase are part of the claimed invention.

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Regarding claim 23, the phrase "predetermine" in line 5 renders the claim indefinite because it is unclear whether the limitation(s) following the phrase are part of the claimed invention.

Regarding claim 24, the phrase "predetermine" in line 5 renders the claim indefinite because it is unclear whether the limitation(s) following the phrase are part of the claimed invention.

Regarding claim 25, the phrase "predetermine" in line 5 renders the claim indefinite because it is unclear whether the limitation(s) following the phrase are part of the claimed invention.

Claims 18-20, 26 and 27 are rejected as being dependent of the rejected base claim.

***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1, 2, 4-9, 14, 17-20, 24, 26 and 44 are rejected under 35 U.S.C. 102(b) as being anticipated by Nishizawa et al., (USPAT/5,275,184)

Re claim 1, Nishizawa et al. disclose a method for removing contaminants from a semiconductor processing bath for processing semiconductor wafers the method comprising rapidly removing an upper portion semiconductor processing fluid present in the bath while the wafers are in the bath (see Fig. 2 and Col. 2, lines 62-67 through Col. 5, lines 1-27).

Re claim 2, as applied to claim 1 above, Nishizawa et al. disclose all the claimed limitations including the limitation wherein the semiconductor process bath as an etching bath (see Fig. 2 and abstract).

Re claim 4, as applied to claim 1 above, Nishizawa et al. disclose all the claimed limitations including the limitation wherein the contaminants are removed from the air/liquid interference of the semiconductor processing bath (see Fig. 2)

Re claim 5, as applied to claim 4 above, Nishizawa et al. disclose all the claimed limitations including the limitation wherein the semiconductor process bath as an etching bath (see Fig. 2 and abstract).

Re claim 6, as applied to claim 1 above, Nishizawa et al. disclose all the claimed limitations including the limitation wherein the contaminants include silica (see Fig. 2).

Re claim 7, Nishizawa et al. disclose a method for reducing the contamination on a semiconductor wafer from wet etching bath comprising: processing the semiconductor wafer in the wet etching bath containing and etching fluid; subsequently rapidly removing an upper portion of the etching fluid from the wet etching bath to remove contaminants from the surface of the wet etching bath while retaining the semiconductor wafer in the etching bath and subsequently removing of the wafer from the bath (see Fig. 2 and related text in Col. 2, lines 62-67 through Col. 5, lines 1-27; Col. 20, lines 7-14).

Re claim 8, as applied to claim 7 above, Nishizawa et al. disclose all the claimed limitations including the limitation wherein substantial etching fluid (see Fig 2 and related text in Col. 3, lines 17-23).

Re claim 9, as applied to claim 8 above, Nishizawa et al. disclose all the claimed limitations including the limitation wherein the upper portion of the etching fluid is removed by draining a top portion of the etching fluid from wet etching bath (see Fig. 2 and related text in Col. 7, lines 2-14).

Re claim 14, Nishizawa et al. disclose a method for removing contaminants from a semiconductor processing bath for processing semiconductor wafers the method comprising: rapidly removing an upper portion of a semiconductor processing fluid present in the bath while the wafers are in the bath by rapidly removing a wafer boat containing the semiconductor wafer from the bath (see Fig. 2).

Re claim 17, Nishizawa et al. disclose a method for etching a semiconductor wafer the method comprising: placing and etching fluid into a wet etching vessel; placing the semiconductor fluid into wet etching fluid; contacting the semiconductor wafer with the etching fluid for period or time; rapidly removing a portion of the etching fluid from the upper surface of wet etching vessel while keeping the semiconductor wafer immersed in the etching fluid (see Fig. 2, and related text in Col. 2, lines 62-67 through Col. 5, lines 1-27; Col. 20, lines 7-14).

Re claim 18 as applied to claim 17 above, Nishizawa et al. disclose all the claimed limitations including the limitation wherein the semiconductor is a silicon wafer (see abstract)

Re claim 19 as applied to claim 18 above, Nishizawa et al. disclose all the claimed limitations including the limitation wherein the etching fluid is an aqueous HF solution (see related text in Col. 11, lines 18-20).

Re claim 20, as applied to claim 17 above, Nishizawa et al. disclose all the claimed limitations including the limitation wherein the etching fluid is removed from an upper surface of

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the wet etching vessel by draining of the top portion of the etching fluid from the wet etching vessel (see Fig. 2 and related text in Col. 7, lines 2-14).

Re claim 24, Nishizawa et al. disclose a method for etching a semiconductor wafer the method comprising: placing and etching fluid into a wet etching vessel; placing the semiconductor fluid into wet etching fluid; contacting the semiconductor wafer with the etching fluid for period or time; rapidly removing a portion of the etching fluid from the upper surface of wet etching vessel by rapidly removing a wafer boat containing the semiconductor wafers from the wet etching vessel (see Fig. 2).

Re claim 26, as applied to claim 17 above, Nishizawa et al. disclose all the claimed limitations including the limitation wherein the etching fluid is removed from the upper surface of the wet etching vessel by physically removing a top portion of the etching fluid from the wet etching bath (see Fig. 2).

Re claim 44, Nishizawa et al. disclose a method for etching a semiconductor wafer the method comprising: immersing a wafer boat in an etching vessel having an etching fluid therein for sufficient time to etch the silicon wafer; and rapidly removing the wafer boat from the etching vessel to remove the contaminants residing on the upper surface of the etching fluid by causing the etching fluid to spill out of the vessel (see Fig. 2).

### ***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.



10. Claims 10, 16 and 27 rejected under 35 U.S.C. 103(a) as being unpatentable over Nishizawa et al., USPAT/5,275,184 in view of Itoh et al., USPAT/5,795,401.

Re claims 10 and 16, Nishizawa et al. teach all the limitation in the claimed limitations as applied in claim 7 except the use of paddle to remove the fluid from the top portion of the etching process bath.

Itoh et al. disclose the use of back paddle to jet (remove) out the wash fluid during process of cleaning of semiconductor substrate (see related text in Col. 10, lines 18-48).

Therefore, it would have been obvious to one ordinary skill in the art at the time of applicant's claimed invention was made to have provided Nishizawa et al. reference with paddle as taught by Itoh et al. because the use of paddle would have provided removing of contaminants from the top of the wafer etching bath.

Re claim 27, Nishizawa et al. teach all the limitation in the claimed invention as applied in claim 26 except the use of paddle to remove the fluid from the top portion of the etching process bath.

Itoh et al. disclose the use of back paddle to jet (remove) out the wash fluid during process of cleaning of semiconductor substrate (see related text in Col. 10, lines 18-48).

Therefore, it would have been obvious to one ordinary skill in the art at the time of applicant's claimed invention was made to have provided Nishizawa et al. reference with paddle as taught by Itoh et al. because the use of paddle would have provided removing of contaminants from the top of the wafer etching bath.

11. Claims 11 and 21 rejected under 35 U.S.C. 103(a) as being unpatentable over Nishizawa et al., USPAT/5,275,184 in view of Mohindra et al., USPAT/5,958,146.

Re claim 11, Nishizawa et al. disclose a method for removing contaminants from a semiconductor processing bath for processing semiconductor wafers the method comprising: rapidly removing an upper portion of a semiconductor processing fluid presented in the bath, while the wafer in the bath (see Fig. 2). Although, the process is inherent, Nishizawa et al. do not mention use of valve to remove the etching fluid.

Mohindra et al. disclose the use of valve to remove during cleaning (etching) process of the semiconductor wafer (see related text in Col. 3, lines 56-60).

Therefore, it would have been obvious to one ordinary skill in the art at the time of applicant's claimed invention was made to have provided Nishizawa et al. reference with a valve as taught by Mohindra et al. because the use of valve would have provided another method of removing contaminants from the top of the wafer etching bath when the valve opens by mechanical means.

Re claim 21, Nishizawa et al. disclose a method for etching a semiconductor wafer the method comprising: placing an etching fluid into a wet etching vessel; placing the semiconductor wafer in the etching fluid; contacting the semiconductor wafer with the etching fluid for a period of time; and rapidly removing a portion of the etching fluid from the upper surface of the wet etching vessel (see Fig. 2). Although, the process is inherent, Nishizawa et al. do not mention use of valve to remove the etching fluid.

Mohindra et al. disclose the use of valve to remove during cleaning (etching) process of the semiconductor wafer (see related text in Col. 3, lines 56-60).

Therefore, it would have been obvious to one ordinary skill in the art at the time of applicant's claimed invention was made to have provided Nishizawa et al. reference with a valve

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as taught by Mohindra et al. because the use of valve would have provided removing of contaminants from the top of the wafer etching bath when the valve opens by mechanical means.

12. Claims 12, 15, 22 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishizawa et al. (USPAT/5,275,184) in view of Hayami et al. (USPAT/5,474,616).

Re claim 12, Nishizawa et al. disclose a method of removing contaminants from a semiconductor processing bath for processing semiconductor wafers the method comprising: rapidly removing an upper portion of a semiconductor processing fluid present in the bath, while the wafers are in the bath (see Fig. 2). However, Nishizawa et al. do not disclose removing a portion of the etching fluid from upper surface of the etching bath, by hingedly releasing a door located at an upper portion of the bath.

Hayami et al. disclose removing a portion of the etching fluid from upper surface of the etching bath, by hingedly releasing a door located at an upper portion of the bath (see Fig. 41 and 42).

Therefore, it would have been obvious to one ordinary skill in the art at the time of applicant's claimed invention was made to have provided Nishizawa et al. reference with a hingedly released door as taught by Hayami et al. because the use of the door would have provided removing of contaminants from the top of the wafer etching bath when the door opened.

Re claim 15, Nishizawa et al. disclose a method of removing contaminants from a semiconductor processing bath for processing semiconductor wafers the method comprising: rapidly removing an upper portion of a semiconductor processing fluid present in the bath, while the wafers are in the bath (see Fig. 2). However, Nishizawa et al. do not disclose removing a

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portion of the etching fluid from upper surface of the etching bath, by telescopically collapsing sidewalls of the vessel containing the bath.

Hayami et al. disclose removing a portion of the etching fluid from upper surface of the etching bath, by telescopically collapsing sidewalls of the vessel containing the bath.

(see Fig. 41 and 42).

Therefore, it would have been obvious to one ordinary skill in the art at the time of applicant's claimed invention was made to have provided Nishizawa et al. reference with a hingedly released door as taught by Hayami et al. because the use of telescopically collapsing sidewalls would have provided removing of contaminants from the top of the wafer etching bath when the sidewall folded.

Re claim 22, Nishizawa et al. disclose a method for etching a semiconductor wafer the method comprising: placing and etching fluid into a wet etching vessel; placing the semiconductor fluid into wet etching fluid; contacting the semiconductor wafer with the etching fluid for period or time; rapidly removing a portion of the etching fluid from the upper surface of wet etching vessel while keeping the semiconductor wafer immersed in the etching fluid (see Fig. 2, and related text in Col. 2, lines 62-67 through Col. 5, lines 1-27; Col. 20, lines 7-14).

However, Nishizawa et al. do not disclose removing a portion of the etching fluid from upper surface of the etching bath, by hingedly releasing a door located at an upper portion of the bath.

Hayami et al. disclose removing a portion of the etching fluid from upper surface of the etching bath, by hingedly releasing a door located at an upper portion of the bath (see Fig. 41 and 42).

Therefore, it would have been obvious to one ordinary skill in the art at the time of applicant's claimed invention was made to have provided Nishizawa et al. reference with a hingedly released door as taught by Hayami et al. because the use of the door would have provided removing of contaminants from the top of the wafer etching bath when the door opened.

Re claim 25, Nishizawa et al. disclose a method for etching a semiconductor wafer the method comprising: placing and etching fluid into a wet etching vessel; placing the semiconductor fluid into wet etching fluid; contacting the semiconductor wafer with the etching fluid for period or time; rapidly removing a portion of the etching fluid from the upper surface of wet etching vessel while keeping the semiconductor wafer immersed in the etching fluid (see Fig. 2, and related text in Col. 2, lines 62-67 through Col. 5, lines 1-27; Col. 20, lines 7-14). However, Nishizawa et al. do not disclose removing a portion of the etching fluid from upper surface of the etching bath, by telescopically collapsing sidewalls of the vessel containing the bath.

Hayami et al. disclose removing a portion of the etching fluid from upper surface of the etching bath, by telescopically collapsing sidewalls of the vessel containing the bath. (see Fig. 41 and 42).

Therefore, it would have been obvious to one ordinary skill in the art at the time of applicant's claimed invention was made to have provided Nishizawa et al. reference with a hingedly released door as taught by Hayami et al. because the use of telescopically collapsing sidewalls would have provided removing of contaminants from the top of the wafer etching bath when the sidewall folded.

*Allowable Subject Matter*

13. The indicated allowability of claims 11,12, 15, 21, 22, and 25 is withdrawn in view of the newly discovered reference(s) to Hayami et al. (USPAT/5,474,616). Rejections based on the newly cited reference(s) follow.

*Correspondence*

14. Claims 13 and 23 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action.
15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brook Kebede whose telephone number is (703) 306-4511. The examiner can normally be reached on 8-5 Monday to Friday.
16. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (703) 308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.
17. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Brook Kebede

*BK*  
November 18, 2000

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